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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,908	01/21/2004	John E. Holowczak	U76.12-0003	4656
<div>7590 01/09/2007 KINNEY & LANGE, P.A. THE KINNEY & LANGE BUILDING 312 South Third Street Minneapolis, MN 55415-1002</div>			<div>EXAMINER DANIELS, MATTHEW J</div>	
			<div>ART UNIT 1732</div>	<div>PAPER NUMBER</div>
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/09/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/761,908

Applicant(s)

HOLOWCZAK ET AL.

Examiner

Matthew J. Daniels

Art Unit

1732

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-28 is/are pending in the application.
- 4a) Of the above claim(s) 27 and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 1/21/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. **Claims 1-26**, drawn to methods, classified in class 264, subclass 918.
 - II. **Claims 27 and 28**, drawn to a ceramic assembly, classified in class 164, subclass 63.
2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by another and materially different process, such as shaping a lost wax investment by hand to provide either complex ligands or an internal cavity and coating the wax investment with a ceramic material. Shaping wax by hand would not be a “rapid prototyping prototyping” process.
3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, recognized divergent subject matter, and because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.
4. Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the

Art Unit: 1732

inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

5. During a telephone conversation with David Fairbairn on 28 December 2006 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-26. Affirmation of this election must be made by applicant in replying to this Office action. Claims 27 and 28 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

6. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1, 2, 4-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver (USPN 4341725) in view of Whalen (USPN 5824250). **As to Claim 1**, Weaver teaches a method for producing ceramic articles, comprising the steps of:

- a) providing a disposable mold having a cavity which has the shape of the desired ceramic article (1:55-68 and 2:49-68)
- b) filling the cavity with a ceramic slurry which includes a liquid carrier (1:60-62)
- c) cooling the slurry filled mold cavity to solidify the slurry (1:62-65 and column 2)
- d) removing the disposable mold (1:63-65 and 2:49-56)
- e) removing substantially all of the original liquid carrier from the solidified slurry to produce a ceramic article (2:23-48).

Weaver is silent to the rapid prototyping process to produce the mold. However, Whalen teaches that it is known to use a rapid prototyping process to produce a disposable mold (3:18-37). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Whalen into that of Weaver in order to (a) allow design changes in components, (b) build mold components with thin, non-machineable sections or complex non-injectable protrusions, and (c) reduce the manufacturing costs by directly fabricating fugitive molds for casting of ceramic slurries (Whalen, 3:60-67).

As to Claim 2, Weaver (2:11) teaches aqueous slurries. **As to Claim 4**, Whalen teaches wax (3:24-27), among other materials. **As to Claim 5**, Whalen teaches that the mold may be removed prior to the removal of the original liquid carrier (3:54-58). **As to Claim 6**, Weaver teaches that it is known to dry prior removal of the mold (2:2-4). **As to Claim 7**, Weaver teaches at least sublimation (2:30-48) and vacuum dewatering (2:46). **As to Claim 8**, Weaver teaches sintering which would inherently improve mechanical properties (2:47-48).

Art Unit: 1732

8. **Claims 3** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver (USPN 4341725) in view of Whalen (USPN 5824250), and further in view of Downing (USPN 3885005). Weaver and Whalen teach the subject matter of Claim 1 above under 35 USC 103(a).

As to Claim 3, Weaver teaches ceramic particles (4:15-21), an amount of cryoprotectant sufficient to suppress the formation of large crystals (3:31-32), colloidal silica (2:14), less than 5% of other additives (sodium silicate, for example, 5:8), and a balance of water. Weaver is silent to the particular mixture of 70%-90% ceramic particles with 10%-30% of a liquid suspension of a colloidal ceramic. However, Downing teaches 70%-90% ceramic particles with 10%-30% of a liquid suspension of a colloidal ceramic (2:7-12 and Table, example 5). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Downing into that of Weaver because Weaver suggests Downing's method (2:8-9).

9. **Claims 9, 10, 12-18, and 20-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver (USPN 4341725) in view of Whalen (USPN 5824250) and Campion (USPN 5503218). **As to Claim 9**, Weaver teaches a method for producing ceramic articles, comprising the steps of:

- a) providing a disposable mold having a cavity which has the shape of the desired ceramic article (1:55-68 and 2:49-68)
- b) filling the cavity with a ceramic slurry which includes a liquid carrier (1:60-62)
- c) cooling the slurry filled mold cavity to solidify the slurry (1:62-65 and column 2)
- d) removing the disposable mold (1:63-65 and 2:49-56)

Art Unit: 1732

e) removing substantially all of the original liquid carrier from the solidified slurry to produce a ceramic article (2:23-48).

Weaver is silent to

- a) producing a ceramic mold for casting metallic parts
- b) using a rapid prototyping process to produce the mold.
- c) the external shape corresponding to the desired external shape of the metallic part and placing the temporary pattern in a container

However, these aspects of the invention would have been prima facie obvious for the following reasons:

- a) Campion teaches producing a ceramic mold for casting metallic parts (Figs. 1-4).
- b) Whalen teaches that it is known to use a rapid prototyping process to produce a disposable mold (3:18-37).
- c) Campion teaches the external shape corresponding to the desired external shape of the metallic part and placing the temporary pattern in a container (Fig. 4).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Whalen and Campion into that of Weaver in order to (a) allow design changes in components (Whalen, 3:60-67, Campion, 1:26-46), (b) build mold components with thin, non-machineable sections or complex non-injectable protrusions (Whalen, 3:60-67, Campion, 1:26-46), (c) reduce the manufacturing costs by directly fabricating fugitive molds for casting of ceramic slurries (Whalen, 3:60-67, Campion, 1:26-46).

As to Claim 10, Weaver (2:11) teaches aqueous slurries. **As to Claim 12**, Whalen teaches wax (3:24-27), among other materials. **As to Claim 13**, Whalen teaches that the mold

Art Unit: 1732

may be removed prior to the removal of the original liquid carrier (3:54-58). **As to Claim 14**, Weaver teaches that it is known to dry prior removal of the mold (2:2-4). **As to Claim 15**, Weaver teaches at least sublimation (2:30-48) and vacuum dewatering (2:46). **As to Claim 16**, Weaver teaches sintering which would inherently improve mechanical properties (2:47-48).

As to Claim 17, Weaver teaches a method for producing ceramic articles, comprising the steps of:

- a) providing a disposable mold having a cavity which has the shape of the desired ceramic article (1:55-68 and 2:49-68)
- b) filling the cavity with a ceramic slurry which includes a liquid carrier (1:60-62)
- c) cooling the slurry filled mold cavity to solidify the slurry (1:62-65 and column 2)
- d) removing the disposable mold (1:63-65 and 2:49-56)
- e) removing substantially all of the original liquid carrier from the solidified slurry to produce a ceramic article (2:23-48).

Weaver is silent to

- a) producing a ceramic mold for casting metallic parts
- b) using a rapid prototyping process to produce the mold.
- c) the external shape corresponding to the desired external configuration and an internal passage shape corresponding to the shape of the desired metallic part internal passage shape of the metallic part and placing the temporary pattern in a container

However, these aspects of the invention would have been prima facie obvious for the following reasons:

- a) Campion teaches producing a ceramic mold for casting metallic parts (Figs. 1-4).

Art Unit: 1732

b) Whalen teaches that it is known to use a rapid prototyping process to produce a disposable mold (3:18-37).

c) Champion teaches the external shape corresponding to the desired external configuration and an internal passage shape (2:53-56 and area between 2 and 4 in Fig. 2) corresponding to the shape of the desired metallic part internal passage shape of the metallic part (area between 2 and 4 in Fig. 2) and placing the temporary pattern in a container (Fig. 4).

It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the methods of Whalen and Champion into that of Weaver in order to (a) allow design changes in components (Whalen, 3:60-67, Champion, 1:26-46), (b) build mold components with thin, non-machineable sections or complex non-injectable protrusions (Whalen, 3:60-67, Champion, 1:26-46), (c) reduce the manufacturing costs by directly fabricating fugitive molds for casting of ceramic slurries (Whalen, 3:60-67, Champion, 1:26-46). **As to Claim 18**, Weaver (2:11) teaches aqueous slurries. **As to Claim 20**, Whalen teaches wax (3:24-27), among other materials. **As to Claim 21**, Whalen teaches that the mold may be removed prior to the removal of the original liquid carrier (3:54-58). **As to Claim 22**, Weaver teaches that it is known to dry prior removal of the mold (2:2-4). **As to Claim 23**, Weaver teaches removing the original liquid carrier at a temperature below the solidification point (2:31, lyophilizing is synonymous with freeze drying). **As to Claim 24**, Weaver teaches sintering which would inherently improve mechanical properties (2:47-48). **As to Claim 25**, Champion teaches a plurality of channels which extend through the model and connect the external surface of the model with the internal surface of the model (Fig. 2).

10. **Claims 11 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver (USPN 4341725) in view of Whalen (USPN 5824250) and Campion (USPN 5503218), and further in view of Downing (USPN 3885005). Weaver and Whalen teach the subject matter of Claims 9 and 17 above under 35 USC 103(a). **As to Claims 11 and 19**, Weaver teaches ceramic particles (4:15-21), an amount of cryoprotectant sufficient to suppress the formation of large crystals (3:31-32), colloidal silica (2:14), less than 5% of other additives (sodium silicate, for example, 5:8), and a balance of water. Weaver is silent to the particular mixture of 70%-90% ceramic particles with 10%-30% of a liquid suspension of a colloidal ceramic. However, Downing teaches 70%-90% ceramic particles with 10%-30% of a liquid suspension of a colloidal ceramic (2:7-12 and Table, example 5). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Downing into that of Weaver because Weaver suggests Downing's method (2:8-9).

11. **Claim 26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Weaver (USPN 4341725) in view of Whalen (USPN 5824250) and Campion (USPN 5503218), and further in view of Sellers (USPN 5720431). Weaver and Whalen teach the subject matter of Claim 17 above under 35 USC 103(a). **As to Claim 26**, Weaver is silent to complex passages, and it is unclear whether Campion teaches any passage which can be considered "complex" according to the definition on page 2 (paragraph [0002]) of the instant specification which requires that the passage cannot be produced by drilling and fulfill one of the conditions listed on page 2 of the specification. However, Campion clearly suggests that the geometry of the pattern, and the number and position of the partitions is determined for each particular application and the shape

Art Unit: 1732

of the vane cavities to be obtained (2:53-58), which appears to read on the claimed invention. Additionally, Sellers teaches that it is conventional and desirable to provide complex passages (for example, item 50 in Fig. 4) in order to route air in a radial passage to the tip (5:35-45). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Sellers into that of Weaver in order to provide cooling air passages to the tip to cool it and also to enhance the aerodynamic sealing efficacy between the tip and its attendant outer air seal or shroud (Sellers, 5:35-45).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Daniels whose telephone number is (571) 272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1732

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MJD 12/28/06

MSD


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1/3/07